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**STANDARD METHODS FOR THE EXAMINATION OF
DAIRY PRODUCTS PROPOSED CHANGES FOR THE
ELEVENTH EDITION**

**Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio**

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STANDARD METHODS FOR THE EXAMINATION OF DAIRY PRODUCTS

Proposed Changes for the Eleventh Edition

The present Subcommittee on Standard Methods is comprised of nine reference committees of three or four members, with each committee responsible for reviewing trends and changes in certain areas and for revision of related chapters.

The following summary itemizes the principal changes they have made in the 11th edition of Standard Methods for the Examination of Dairy Products, now in preparation. In addition to review by the subcommittee members, the proposed material has been reviewed by members of the Coordinating Committee on Laboratory Methods and other individuals having interest in special fields. The Coordinating Committee on Laboratory Methods, the Committee on Evaluation and Standards, and the Governing Council will each be asked to take action on the 11th edition in connection with its adoption as an official report of the Association. This review has been prepared for the general information of the membership. Dr. Black, Chairman of the Subcommittee, will welcome comments.

The general format of the 11th edition will be identical with that of the 10th, except that the applications and interpretations now collected in Chapter 1 will be incorporated in the respective chapters on analytical procedures. This has resulted in a shorter introductory chapter which considers basic public health concepts for the sanitary quality of dairy products, inspection, laboratory control, screening tests, and the relative accuracy of methods of measuring sanitary quality. New material includes a discussion of radioactivity in relation to milk, recent applications of split sample tests, and the need for new quality tests for use by either official agencies or industry.

Collection of samples of milk and cream has been placed in a separate chapter. Special attention has been given to new material on collecting samples from large tanks, vats, etc., and en route samples from bulk farm tanks.

No major changes have been made in the agar plate count procedure. Although previous editions have provided a test to detect possible toxicity of buffered phosphate dilution water, no test has been provided for determining whether distilled water is free from toxic substances. A recently developed microbiological test for detection of growth inhibition or stimulation will be included in the 11th edition. By adding small amounts of individual chemicals to separate portions of distilled water and inoculating with selected cultures of microorganisms, it is possible to determine whether the water contains excess amounts of nitrogen, carbon, toxic metals, etc.

Theoretical comparisons indicate that the 3-out-of-4 method of averaging bacterial counts is considerably more stringent than the logarithmic average in grading the bacterial quality of milk. Recent studies have shown that 3-out-of-5 method agrees more closely with logarithmic averages and this will be included in the 11th edition.

The direct microscopic count method has been entirely rewritten and will appear in a separate chapter. The polychrome methylene blue stains in the 10th edition will be replaced by the Levowitz-Weber modification of the Newman-Lampert stain. The importance of Adequate illumination is emphasized and the 11th edition will stipulate use of a better microscope lamp, preferably research type, equivalent to at least 100 watts illumination and having a reflector, condensing system and iris diaphragm.

Little change has been made in dye reduction tests which are regrouped in a separate chapter. Although the resazurin "triple-reading" test will be retained, the "one-hour" resazurin reduction test in the 10th edition will not be included in the 11th edition. As with the direct microscopic method, areas which have changed to bulk farm tanks and mechanical refrigeration report that reduction tests are less useful than in the past.

Accordingly the chapter on miscellaneous microbiological methods will include two simplified viable count methods suitable for grade A raw milk for pasteurization. One method consists of transferring with a platinum loop 0.001 ml of milk to an oval tube containing 3 to 4 ml of melted agar, mixing, laying the tube flat until the agar solidifies, incubating for 48 hours and counting the resulting colonies. The second is a modified Frost little plate consisting of spreading mixtures of 0.01 ml of milk and 0.02 ml of agar over circular 1 sq cm areas on a milk slide, and incubating in a moist chamber at 32 or 35° C for 12 to 20 hours. The micro plates are dried, stained, and counted using 100X magnification. Systematic studies based on average counts obtained with these two viable count methods, prepared in duplicate from the same milk in comparison with agar plate counts, reveals that results essentially identical with standard plate counts can be obtained by each method.

Although the tests in the 10th edition for detection of bacterial growth inhibitors in milk are not as simple as desired, no major changes in improved methodology have been brought to the committee's attention. Accordingly, only minor changes have been made in the 11th edition in tests for antibiotics and other bacterial growth inhibitors.

The material on the coliform group has been entirely rewritten and rearranged in a separate chapter. Since organisms other than coliforms may ferment formate ricinoleate broth to yield gas, this medium will be deleted in the 11th edition. Provision is made for optional incubation at 32° as well as at 35° C. Although the general experience has been that solid media yield maximum information with the least material and labor, for those preferring a multiple tube (MPN) procedure a new table has been prepared giving Confidence Limits for Most Probable Number estimates.

Since differential media are used initially in testing for coliform group organisms in milk, the standard test is more specific than usual "presumptive" tests.

Accordingly this terminology will not be used in the 11th edition. Provision is made that any doubtful colonies may be "verified" by inoculating into brilliant green bile broth or violet red bile or desoxycholate agar, or "completed" tests may be made if necessary under conditions which are outlined.

The scattered material in the 10th edition on thermophilic and thermophilic bacteria has been brought together in a chapter to which has been added new material on psychrophilic bacteria. In addition to psychrophilic plate counts incubated at low temperatures, a "storage quality test" of products at low temperature is also provided for those wishing to use such procedures.

The material on pathogens previously scattered through Standard Methods has been brought together in one chapter, the methods brought up to date and entirely rewritten and rearranged. New material has been added on staphylococci and streptococci. Since bovine infections with the rickettsia, Coxiella burnetii, apparently occur in all parts of the United States, methods are given for their detection in milks. The capillary tube agglutination test is the method of choice for testing milk specimens and is ideally suited for rapid screening of cow's milk or pooled milks of entire herds.

Methods for the examination of milk products formerly appearing under ingredients used in frozen dairy foods has been placed in a separate chapter devoted to concentrated milks and cultured products. Inasmuch as dilution blanks prepared with lithium hydroxide have been shown to be toxic, sodium citrate will be substituted wherever milk powders are insoluble in standard diluent. Cultured milks are now controlled operations in most dairy plants, so methods and standards for coliform group, and yeasts and molds, applicable to buttermilk, sour cream, yogurt, and acidophilus products have been included.

Revision of the chapter on butter has included addition of a proteolytic count and test for coliforms. In the chapter on cheese provision has been made for examination of cottage cheese for coliforms, and for a membrane filter test for psychrophilic bacteria.

Only minor changes have been made in the chapters on the ingredients of ice cream and related products, and on ice cream and related frozen products.

In the chapter on sediment tests, extensive revisions have been made to include sediment tests of bulk farm tanks and off-the-bottom samples.

Minor changes have been made in the chapter on sanitization of equipment, such as optional use of sodium alginate swabs in place of cotton. Although the membrane filter method has not been found suitable for total and coliform counts of milk, it can be used to advantage in filtering large quantities of sterile waters used to rinse pipelines cleaned-in-place, or other equipment or containers. Accordingly its use is described in this chapter.

A new chapter has been prepared on tests for sanitization of dairy plant water and air supplies. Water of suitable sanitary quality may still contain small numbers of psychrophilic bacteria which grow under prolonged refrigeration during storage of milk and milk products and may result in off-flavors, odors, or deterioration of the manufactured products with which it comes in intimate contact, as in rinsing butter and cottage cheese. For detection of low numbers of such organisms a plate count and membrane filter method are provided. Since some psychrophiles are very difficult to isolate unless special enrichment procedures are employed, a screening test is included for this purpose.

The use of atmospheric air, water vapor and other gases in processing of milk and milk products by direct incorporation as in mixing and indirectly by application to containers and equipment is becoming increasingly prevalent.

Accordingly methods will be included in the 11th edition for the collection of suitable air samples and for microbiological analyses. The sedimentation test has been retained and the U. S. Public Health Service liquid impinger adapted to aerobiological tests. The Andersen aerosol sampler is suggested for use, and other recognized methods as the air centrifuge, slit impinger, and electrostatic precipitator are permitted.

In addition to miscellaneous chemical methods formerly included in the 10th edition of Standard Methods, the 11th edition will contain methods for the radio-chemical analysis of milk suitable for use by state and local health departments for surveillance purposes. In the past cryoscopic determinations of added water in milk have been laborious, time consuming and consequently expensive. Recent equipment substituting thermistors instead of thermometers for the freezing point measurements permit use of small samples whose temperatures are readily kept uniform and thus the reading at freezing remains constant for a comparatively long period. New equipment complete with refrigeration system, automatic agitation, and automatic controls has greatly simplified detection of added water, and appropriate methods for use will be included in the 11th edition.

The Gerber test for butterfat is generally used in the world except in the United States where the Babcock method has been standard for many years. The Gerber test has, however, been used officially by several states in this country and in accuracy it agrees closely with official ether-extraction methods. Accordingly the Gerber test will be included for milk, cream, and chocolate milk and drinks. It will also replace the Babcock modifications for fat in frozen dairy foods, but since phospholipins in skim milk, and stabilizers and emulsifiers in ice cream, may slightly reduce its accuracy, applications to skim milk, buttermilk, and ice cream will still be regarded as screening tests.

The material on phosphatase has been reorganized to provide more detailed information on necessary controls for the rapid test as well as clarified directions regarding its applicability to a variety of milk products. The rapid test is generally used as a laboratory procedure and the revised directions are predicated on this usage. Reference is made to modifications that may be made for use as a field procedure. One of the principal difficulties in reading of phosphatase tests seems to be inadequate illumination. Accordingly the next edition will require that this chemical test be read under proper uniform illumination such as a single 14-watt daylight type fluorescent bulb as used in a dental X-ray film viewer.

The last chapter will consist of Chemical Methods compiled by the Committee on Editing Methods of Analysis of the Association of Official Agricultural Chemists, and approved for publication by that Association, including current changes to date that are approved at annual meetings.

The formulae for all Culture Media mentioned in the several chapters, and directions for making and using media, will be included in Appendix A, listed alphabetically and numbered for appropriate reference. Similarly Stains will be listed in Appendix B; Reagents and Indicators in Appendix C; detailed Specifications for Chemical Glassware, principally for butterfat, in Appendix D; and, for easy reference and to insure that controls are not overlooked, Appendix E will list all bacteriological controls and checks appearing anywhere in the twenty chapters comprising the 11th edition.

It is expected that the 11th edition of Standard Methods will be in print by the fall of 1960. As this will be the 50th anniversary of the appearance of the first edition, a special anniversary program is being planned for the 1960 annual meeting of the American Public Health Association.

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